User manual

UNI-DATA-GENERATOR I (CAN)

Version 1.0

PST Peter Systemtechnik GmbH

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1 Copyright

With the purchase of the UNI-DATA-GENERATOR I you only acquire the right to use the supplied software. You do not get ownership on the software.

The supplied software is not copy protected. The licensee may create one single backup copy of the software. The creation of further copies, or passing on the software to others is prohibited. Modification of the software or removal of the copyright notice is not allowed.

The company Peter Systemtechnik GmbH reserves any copyright on hardware, software and documentation of the UNI-DATA-GENERATOR I.

The company Peter Systemtechnik GmbH is not bound to release any source code of any of the supplied firmware or software.

2 Trademarks

UNI-DATA-GENERATOR I is a trademark of Peter Systemtechnik GmbH.

PST-Sequence Editor is a trademark of Peter Systemtechnik GmbH.

All other brand and product names are trademarks or registered trademarks of their respective holders.

3 Important notes

Attention: The UNI-DATA-GENERATOR I is a highly complex electronic device. Despite of all built in hardware protections an incorrect wiring on the external interfaces may damage the device! Incorrect wiring may also lead to damaging of other attached devices! Please check the correct wiring before switching on the device.

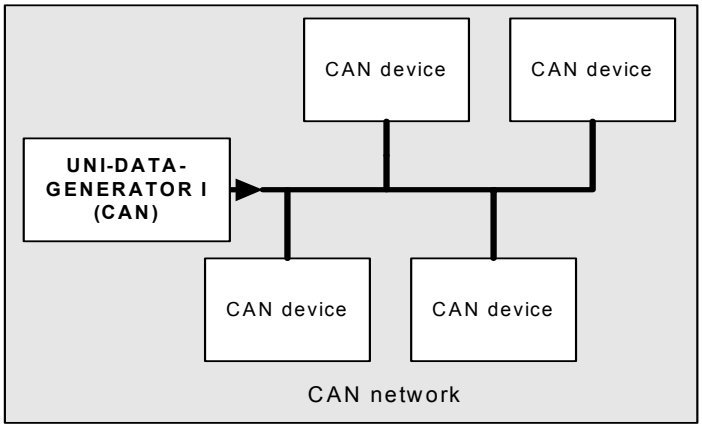
Attention: If the UNI-DATA-GENERATOR I is configured incorrectly, it may disturb the data traffic of the attached devices! Please check if the setup configuration is in accordance to the attached devices before switching on the device.

4 Typographical conventions

Bold	File, file name
Italic	Menu, command, dialog element or program name
<OK>	Button name
Attention:	Important notes and warnings
UDG I	UNI-DATA-GENERATOR I

5 Overview

UNI-DATA-GENERATOR I



5.1 Product overview

The UNI-DATA-GENERATOR I (CAN) is a versatile, user-friendly and highly flexible CAN-Frame-Generator applicable to development, maintenance and production. It's featuring high performance and comprehensive configurability.

As a battery powered device the UDG I provides a maximum of flexibility, especially in mobile applications. Alternatively it can be powered by an external power supply.

The selectable termination resistors allow the UDG I to be used in Low-Speed as well as in High-Speed-CAN-Systems up to 1MBaud.

The transmission of CAN-Messages (single or multiple CAN frames) can be triggered by key, cyclical or event controlled on reception of user defined CAN messages. The integrated keyboard provides 36 configurable user keys (9 keys in 4 layers). Each key has its own programmable LED to indicate the actual function state and can be defined to transmit arbitrary messages. Each key can be programmed with up to 3 different functions (frame transmission at key-press, release and long press) to provide a maximum of flexibility.

The configuration of the Data-Generator (CAN parameters, frame data, repeat cycles etc.) can easily be done using the included software tool on each Windows compatible PC system with USB interface. The UNI-DATA-GENERATOR I is a stand alone device, a PC is only required for configuration not for operation.

5.2 Feature list

The following features are supported by the UNI-DATA-GENERATOR I (CAN):

- Low speed / High speed – CAN support up to 1MBaud
- Supports standard and extended ID as well as remote frames
- Switchable terminating resistors
- Configurable CAN slew rate
- Transmission of CAN messages can be triggered by
  - key press
  - cyclical (time triggered)
  - on reception of user defined CAN messages
- 36 adaptive user keys (9 keys in 4 layers)
- Dedicated programmable function LED for each key
- LED-indicator for Rx, Tx, CAN-Error and Fifo overflow
- Power supply with internal Battery/Accumulator or external 7-24 Volt DC
- Battery Low indicator
- Easy to use PC based configuration software
- USB-Interface for configuration with PC
- Firmware update via USB
- Configuration stored nonvolatile

6 User components

6.1 Keypad

All keys are mounted on the top side:

6.2 CAN plug view (front)

Status-LEDs and CAN Termination-Switch

6.3 SUB-D 9pol male connector

Pin	Signal	Function
1	-	reserved
2	CAN-L	CAN-L
3	--	reserved
4	--	reserved
5	GND	GND
6	--	reserved
7	CAN-H	CAN-H
8	--	reserved
9	Uin	Ext. Power supply 7V-24V DC

6.4 USB connector (type mini B)

6.5 Inserting Batteries / Accumulators

To open the battery case please press on the riffled area in the middle of the UDG I backside and move it downwards as shown on the picture. Please pay attention to the battery polarization symbols when inserting the battery cells.

Close the cover in reverse order.

Attention: Please pay attention to the polarization when inserting the battery cells according to the picture and the pictograms in the housing! False inserted cells may cause damages to the UNI-DATA-GENERATOR I!

Attention: Never use battery/accumulator types with more than 1,5V rated voltage per AA-cell. This could destroy the device!

7 Getting started

This short manual gives you an overview and may be used as a checklist before start using the UNI-DATA-GENERATOR I.

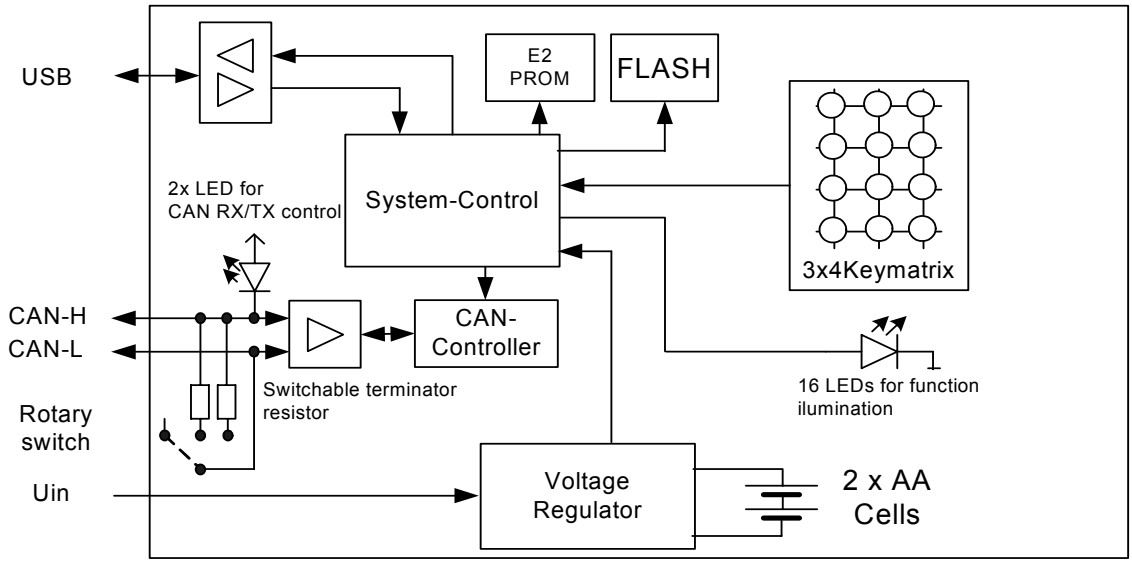
Attention: Before first use of the UNI-DATA-GENERATOR I please read the manual to avoid damaging the UDG I and the connected devices due to false handling.

1. Insert the batteries (This step is not necessary for configuration and for operation using external power supply)
2. Connect the UDG I USB port to the PC
3. Install the UDG I driver (Only necessary the first time the UDG I has been connected to that PC)
4. Start the configuration software *PST-Sequence Editor*
5. Configure the CAN bus parameters (baud rate, SJW, …)
6. Define and configure the CAN messages, key assignments, trigger modes etc.
7. Upload the settings und data from the PC to the UDG I (*File->Upload*)
8. Disconnect the USB-interface
9. Configure the CAN bus termination resistors (rotary switch on the front side)
10. Connect the UNI-DATA-GENERATOR I to the target CAN network
11. Switch on the UNI-DATA-GENERATOR I by pressing the ON/OFF key
12. Select the key pad level using ALT- and CTRL-key
13. Start the manual transmission of the CAN messages by pressing the according keys. Cyclical and response messages are being transmitted automatically without any key actions.

8 Architecture and functionality

8.1 Hardware

Block diagram UNI-DATA-GENERATOR I



The UNI-DATA-GENERATOR I has all parts for CAN communication integrated.

- Powerful CAN-Network-Controller for full system control
- CAN-driver with LED to display CAN activity
- USB-interface for configuration via PC
- Integrated battery case for power line independent power supply
- Voltage regulator for external continuous power supply
- Switchable termination resistors for adapting to different CAN networks
- FLASH and EEPROM memory for firmware and configuration data, capable of being updated via USB
- 3x4 key matrix for ergonomically one hand operation with single switched key illumination for function control

8.2 Function

The basic feature of the UNI-DATA-GENERATOR I is the transmission of CAN messages according to the requirements of the CAN target system.

The UDG I offers different trigger modes to control which message has to transmitted at what time or event. These trigger modes are subdivided into three main groups:

- Key controlled trigger (via integrated keyboard)
- Time controlled trigger
- Receive controlled Trigger (Responding to received CAN messages)

These three trigger modes can be configured using the PC tool *PST-Sequence Editor*. Arbitrary combinations of the trigger modes are possible.

The three trigger modes are defined as follows:

8.2.1 Key controlled trigger

The integrated keyboard provides 36 user keys (3x3 keys in 4 layers) to be configured as triggers for transmitting CAN messages. Each key can be configured to send different messages by pressing and by releasing the key and transmit a third message cyclical as long as the key is being pressed. Another configuration possibility is the toggle function. With the toggle function you can switch between two CAN messages with each key press. Optionally messages can be transmitted cyclical until the next key press.

8.2.2 Time controlled trigger

CAN messages are transmitted cyclically using a configurable cycle time.

Different messages can be transmitted with different cycle times.

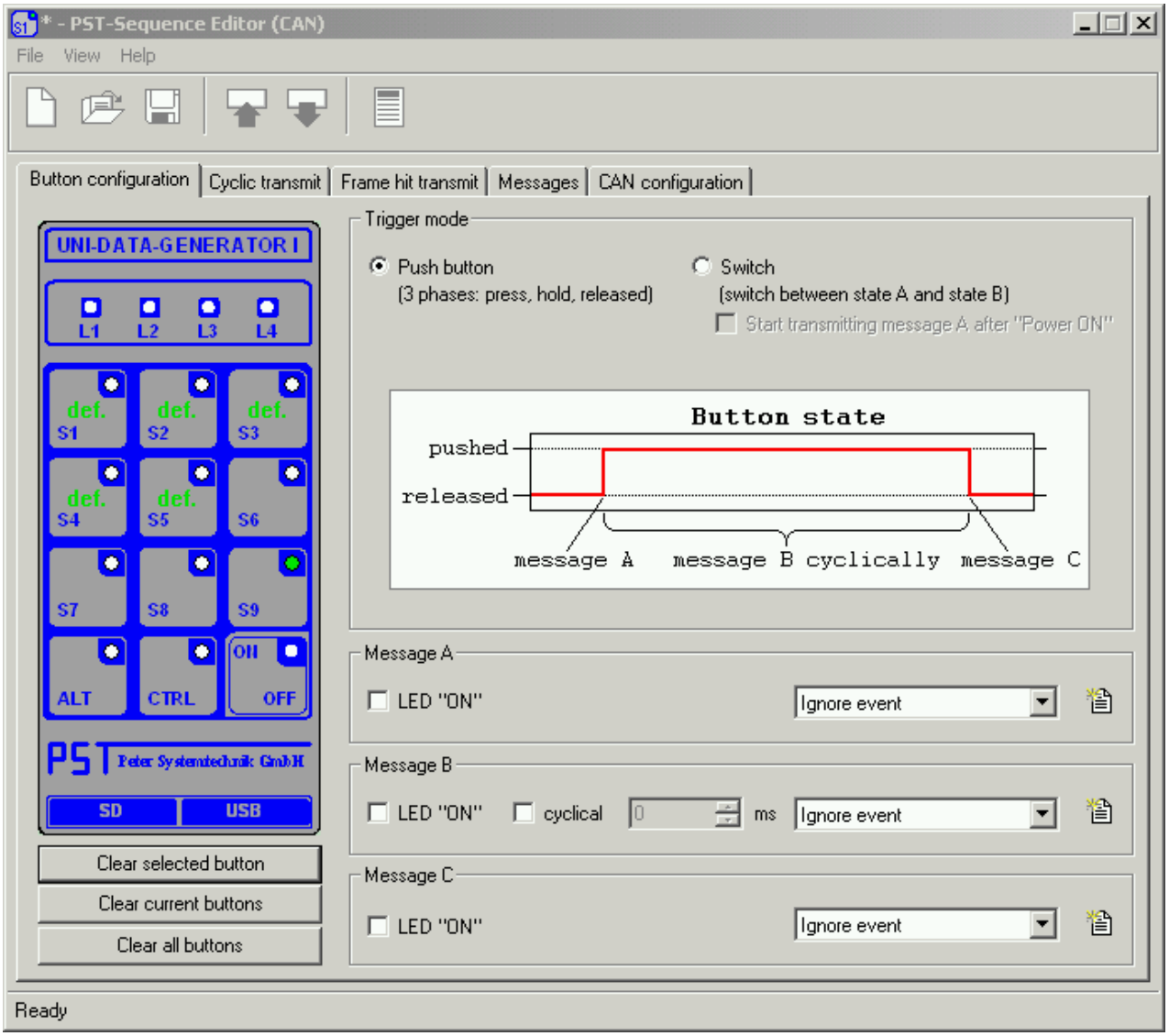
8.2.3 Receive controlled trigger

CAN messages are transmitted as answers to prior received messages (configurable).

Further configuration examples are described in the *PST-Sequence Editor* manual.

9 Software

The UNI-DATA-GENERATOR I can be configured using the PC based software *PST-Sequence Editor*. Communication with the device is being established via USB.



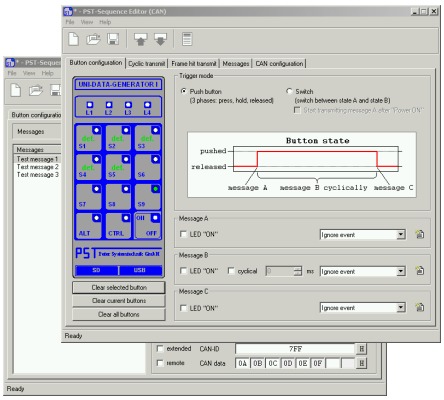
Installation and usage of the software for the UNI-DATA-GENERATOR I with Windows 2000/XP/Vista is described in the *PST-Sequence Editor* manual.

10 Operation

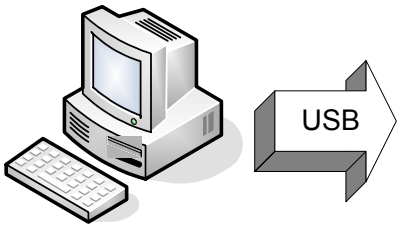
The first use of your UNI-DATA-GENERATOR I includes the following two steps:

10.1 Configuration

Set up interface parameters, CAN messages, key assignment and the trigger modes.



Configuration tool (included)



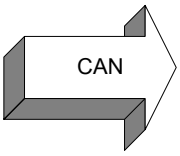
PC **download cable**

UNI-DATA-GENERATOR I

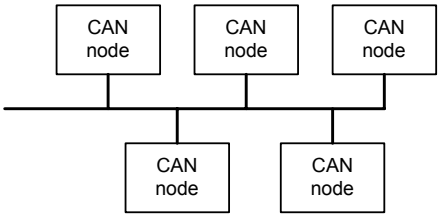
10.2 Operation

Sending CAN messages to the target CAN system

UNI-DATA-GENERATOR I



CAN messages



CAN network

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10.3 Power supply

The UNI-DATA-GENERATOR I can be supplied with power by the following three ways:

- USB supply (only for configuration mode)
- Battery supply (only for operation mode)
- Extern supply (only for operating mode)

10.3.1 Power supply in configuration mode

For configuration the UNI-DATA-GENERATOR I is supplied with power via the USB interface from the PC. An additional power supply with battery or power adapter is not necessary. But it is also not necessary to switch off the external power supply.

10.3.2 Power supply in operation mode

In this mode the UNI-DATA-GENERATOR I is connected to a CAN bus system as an active node, generating and receiving CAN messages.

For CAN data generation the UDG I has to be powered via the internal batteries or externally via pin 9 of the SUB-D connector (voltage range 7V-24V DC). Direct connection to an automotive 12V/24V supply is possible.

For operating the UDG I the USB interface must not be connected!

Hint:	A fully loaded 2000mAh accumulator allows more than 4h of operation. If more operating time is required the UDG I can be supplied by an external voltage source.
Attention:	Never use battery/accumulator types with more than 1,5V volts per AA-Cell! This could destroy the device!

10.4 ON/OFF key

To switch the UNI-DATA-GENERATOR I on or off press the ON/OFF key for at least one second. In the configuration mode the UNI-DATA-GENERATOR I is switched on/off by the USB connection. In this case the ON/OFF key has no function.

When the UDG I is switched on the „ON“-LED is permanent lighted.

If the supply voltage is getting below the minimum required operating voltage the “ON” LED is blinking:

- In battery mode this is an indication for weak batteries. The batteries should be changed as soon as possible.
- When powered by an external power supply, the blinking is an indication of low external supply voltage.

Please pay attention to always have an adequate supply voltage, otherwise a reliable function can not be guaranteed!

In the off state the UNI-DATA-GENERATOR I is completely disconnected from the battery. The standby current becomes nearly zero.

Attention:	If the UNI-DATA-GENERATOR I is not used for a longer time please remove the battery from the battery case to avoid destroying the UNI-DATA-GENERATOR I by leaking batteries!
Hint:	If the switched off UNI-DATA-GENERATOR I stays connected with the CAN network the influence of the terminal resistor stays obtained (Please pay attention to the terminal resistor switch setting).

10.5 Configuration

With the PC tool *PST-Sequence Editor* you can configure your UNI-DATA-GENERATOR I according to your requirements and the needs of your application. For configuration the UNI-DATA-GENERATOR I has to be connected to a Windows compatible PC. Please use the provided USB cable. The power supply of the UNI-DATA-GENERATOR I is guaranteed by the USB interface of the PC.

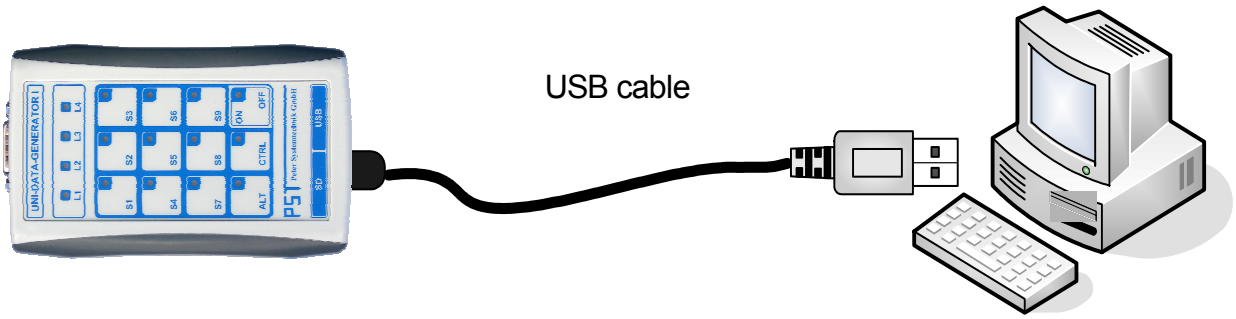
A detailed description of the configurations software tool *PST-Sequence Editor* you can find in the related application manual.

Attention:	Please pay attention that the version number of the manual is according to the version number of the *PST-Sequence Editor* application and the firmware of the UNI-DATA-GENERATOR I!

The following steps are necessary to configure the UNI-DATA-GENERATOR I:

1. Please connect the UDG I to the PC using the provided USB cable between the miniUSB jack of the UDG I and an free PC USB port. As soon as the UDG I is supplied by the PC-USB port LED L1 starts blinking and L2 is permanent on.

   USB connection to configure the UNI-DATA-GENERATOR I:

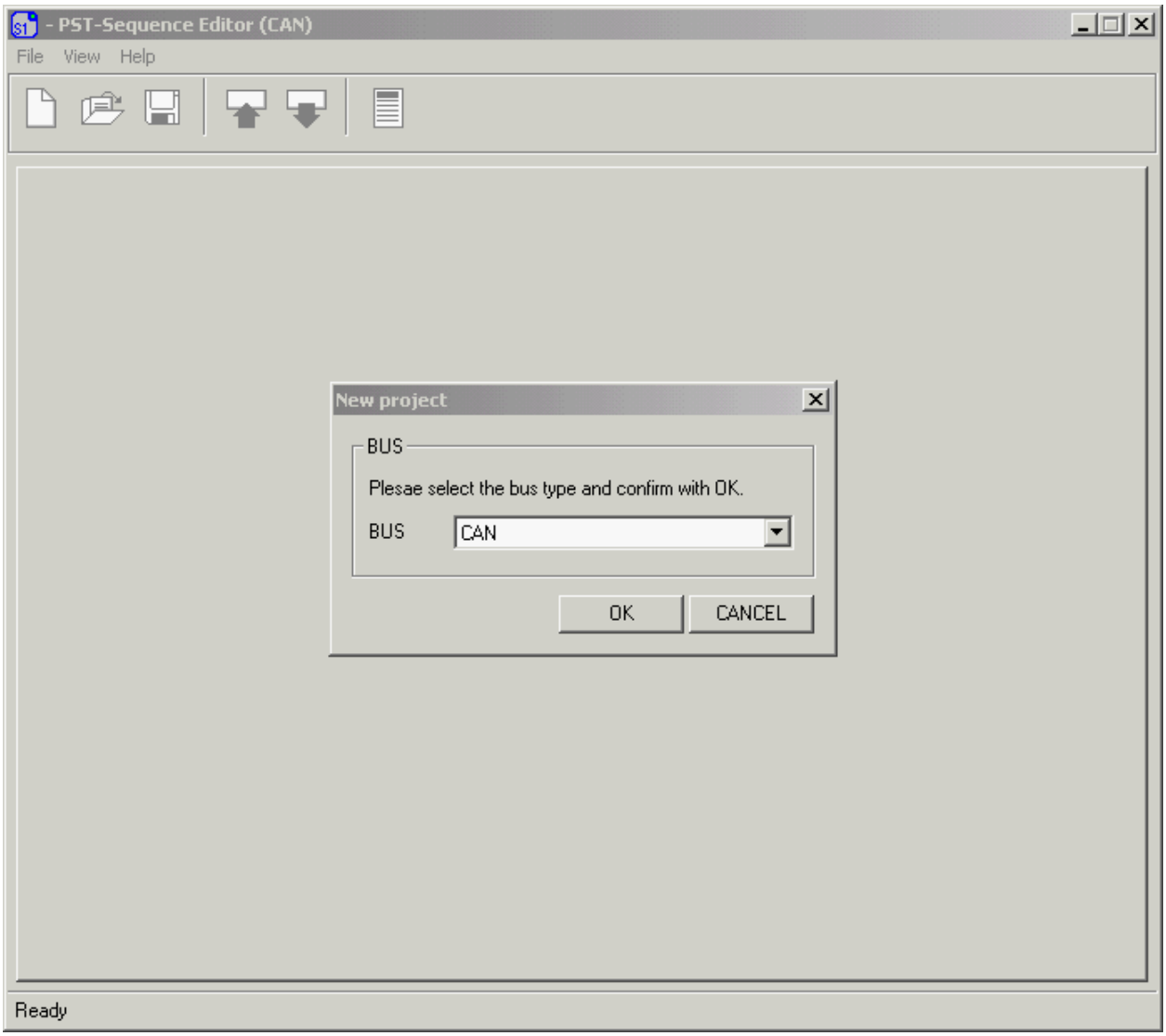


Hint:	During configuration the UNI-DATA-GENERATOR I is supplied by the USB interface of the connected PC. It is not necessary to use an additional power supply or batteries.

Attention:	A transmission of CAN messages is not possible as long as the UNI-DATA-GENERATOR I is connected to the USB interface of the PC!

2. If there are no device drivers installed for the UNI-DATA-GENERATOR I on the PC, Windows will ask you to install it. Follow the instructions on the screen. You can find the appropriate drivers on the included installation CD.

3. Now start the program *PST-Sequence Editor* and chose the interface (CAN in this case) of the UNI-DATA-GENERATOR I to be configured. This manual interface selection allows to prepare the configuration settings without having an UNI-DATA-GENERATOR I connected.



4. You have three choices to load configuration data using the file menu item.

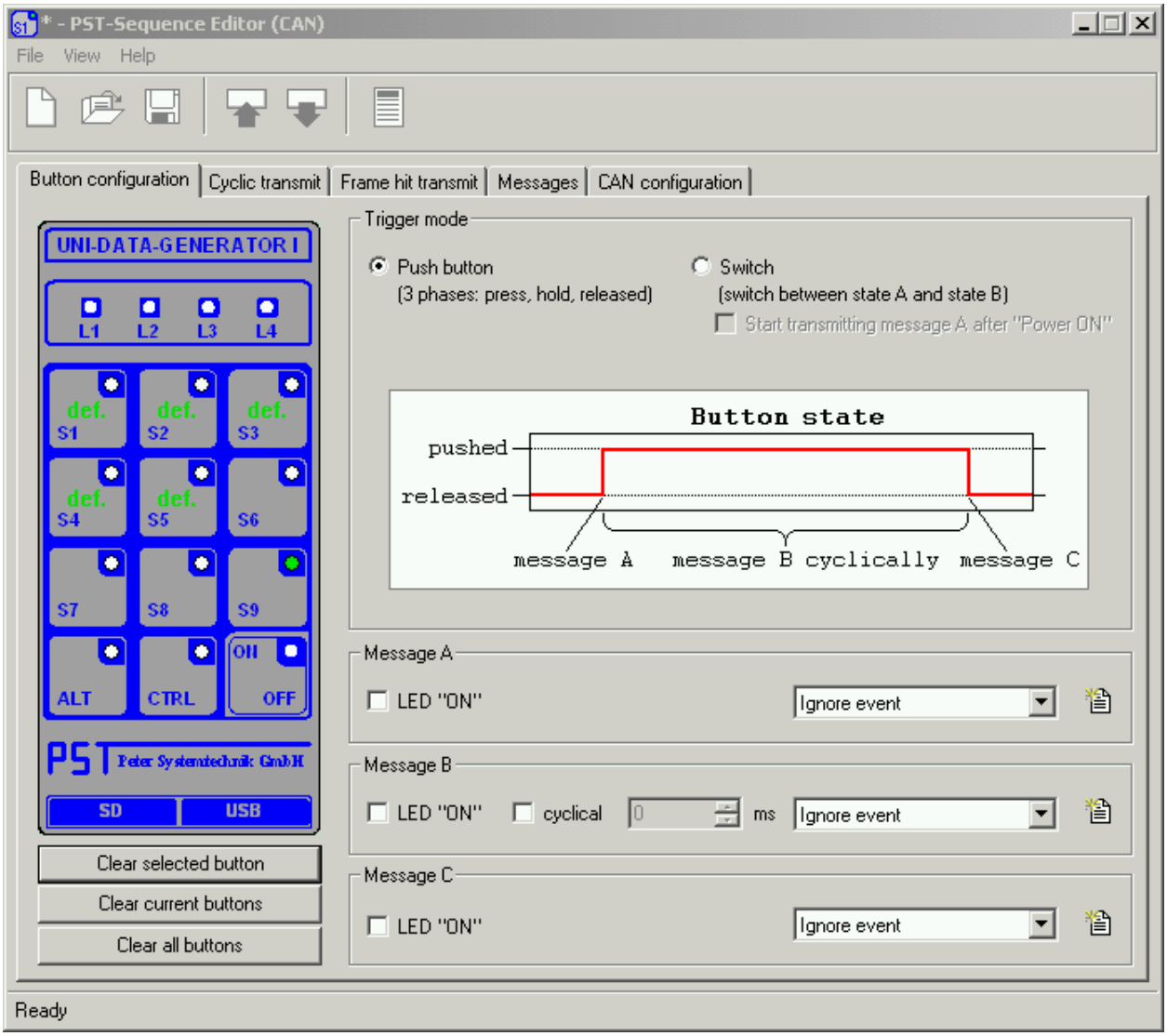
   - *New*
     All configuration data will be reset to default values.
   - *Open*
     A prior stored configuration can be read from a file using a file dialog.
   - *Download*
     The current stored configuration can be read from the attached UDG I.

Hint:	You do not have to choose *File->new* right after starting the program to reset all configurations to default values. Starting the program automatically sets all values to default.

After choosing download you have to select the connected UNI-DATA-GENERATOR I.

Click <OK> and wait until the configuration data has been read.

Now you can configure the UNI-DATA-GENERATOR I according to your needs. After this you can upload the configuration into the UDG I using the menu item *File->Upload*. The configuration will be completed after disconnecting the USB connection.



10.6 Operation usage

1. Switch setting for low and high speed communication

   At the front side of the housing of the UNI-DATA-GENERATOR I on the right hand of the CAN jack there is a rotary switch to select the CAN bus termination resistor. Select the appropriate configuration according to your application requirements.

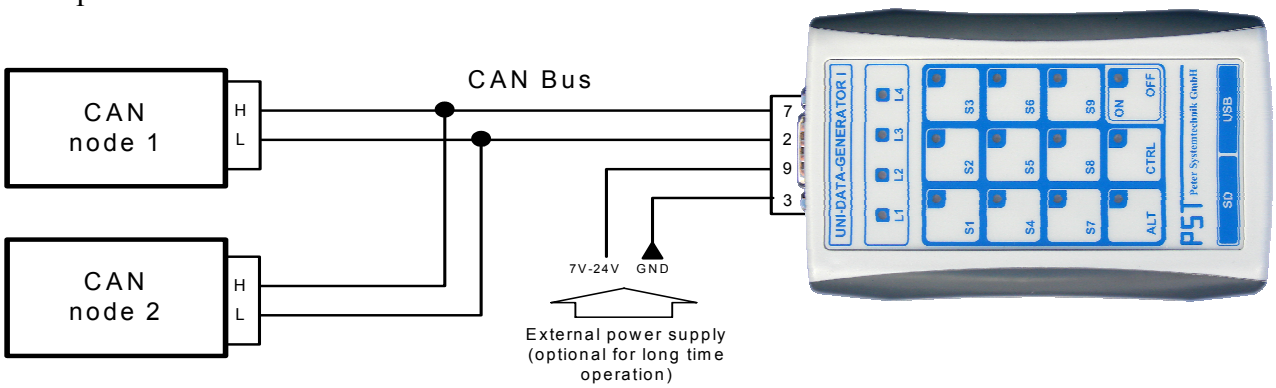
Switch setting	CAN operating mode	Termination resistor
L	Low-Speed	2.700 Ohm
∞	No selection	no termination resistor
H	High-Speed	120 Ohm

Attention: An improper setting of the CAN termination resistor can affect or completely avoid the CAN communication on the connected network.

2. Please connect the UNI-DATA-GENERATOR I to the CAN bus. If you are using accumulators/batteries pay attention that they still have enough capacity! For long time operation an external power supply via Pin 9 of the SUB-D connector +7V to +24V DC is recommended. A direct connection to a 12V or 24V automotive power source is possible.

Attention: Supply voltages of more than 36V (also short time!) can destroy the UNI-DATA-GENERATOR I!

Example:



Attention: As long as UNI-DATA-GENERATOR I is connected to the PC via the USB-interface no CAN communication is possible!

3. The CAN communication starts depending on the configuration as soon as the USB connection to the PC is disconnected and the UNI-DATA-GENERATOR I is supplied with power and switched on.

4. By means of the LED's witch you can find on the front side of the UDG I, you can identify if the CAN bus is working.

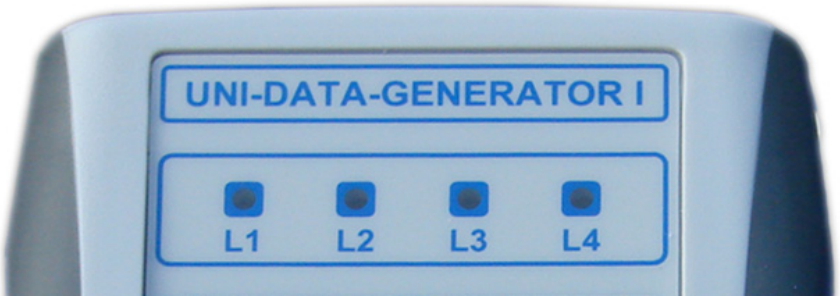
LED state	Description
Tx LED is flashing	UDG I is transmitting data on the CAN bus
Rx LED is flashing	UDG I is receiving data (or ACK) on the CAN bus
both LED's are off	no CAN communication

5. For stopping the communication please switch off the UDG I by pressing the ON/OFF key. The configuration of the UNI-DATA-GENERATOR I is stored nonvolatile without having the system powered. If the UDG I is supplied externally without batteries inserted, you can just disconnect the external power supply to stop the communication.

Hint:	The configuration of the UNI-DATA-GENERATOR I is stored nonvolatile without any power connected to the UDG I.

10.7 Display for activity states (LED L1 – L4)

The four LED´s L1-L4 indicate the different states of the UNI-DATA-GENERATOR I in operation mode:



LED	Status	Remarks
L1	CAN - TX activity	LED blinking while data transmission
L2	CAN – RX matched message received	LED blinking if configured CAN trigger messages is being received.
L3	CAN-ERROR	LED is on if CAN error is detected.
L4	FIFO-Overflow	LED is on if internal transmission Fifo overflow occurred

In configuration mode the LED denotation is different:

L1 blinking and L2 is permanent on while in configuration mode.

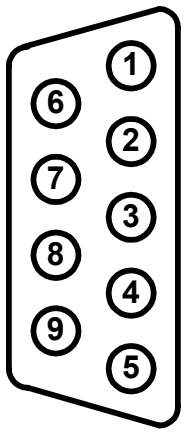
L2 is blinking while data transfer between UNI-DATA-GENERATOR I and PC is active.

Hint:	After a firmware update the functionality of L1-L4 could be changed! Please pay attention to the description in the related user manual!

11 Connectors

11.1 SUB-D connector

Pin No.	Signal	In/Out	Description
1	--	--	reserved
2	CAN-L	IN/OUT	CAN-L
3	--	--	reserved
4	--	--	reserved
5	GND	IN	GND
6	--	--	reserved
7	CAN-H	IN/OUT	CAN-H
8	--	--	reserved
9	Uin	IN	Power supply 7V-24V DC

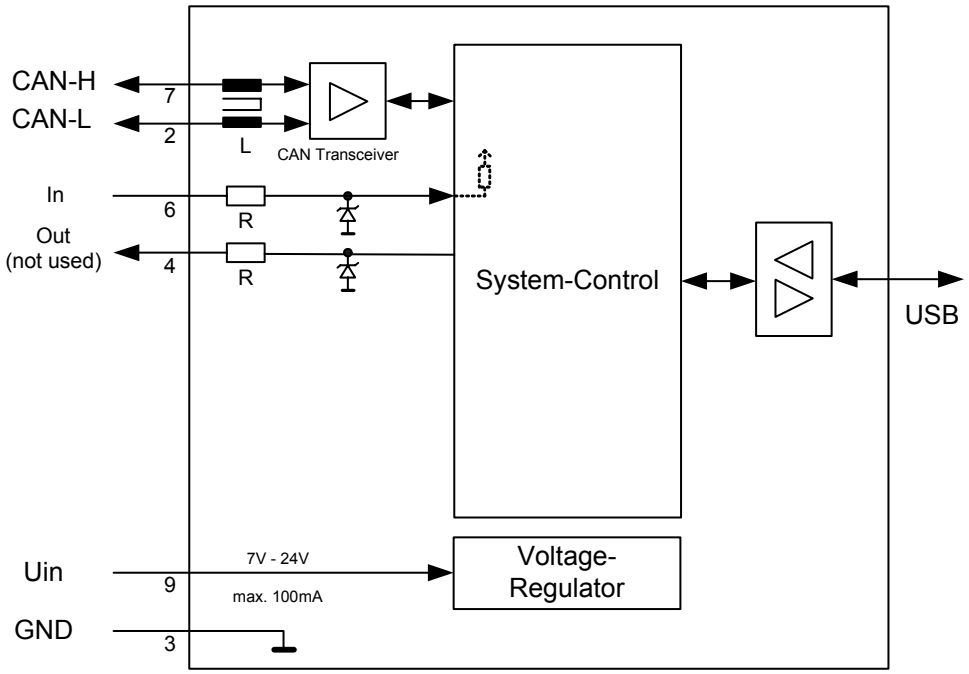


Attention: Do not connect the pins marked as “reserved”!

11.2 USB connector

The USB connector Type is “miniB” and connected according to the USB specification.

11.3 Input circuit



12 Provided data cable

For configuration and upload/download of the UNI-DATA-GENERATOR I data a commercial available USB data cable is provided.

USB cable

13 Technical Data

Power Supply:	
CAN operation mode:	7V...24V DC unregulated/regulated or 1,2V – 1,5V Accumulator/Battery, Type „AA“/„Mignon“ (2 cells required)
Configuration mode:	Supplied via PC USB interface
Power consumption:	
Operation mode	< 1W
Standby mode	< 0,1mW
Under voltage detection:	
Battery supplied:	< 2.2 Volt
External power supply:	< 7 Volt
Temperature range:	
Operation:	0...70°C
Transport:	-40...85°C

Time resolution:	1msec (= min. cycle time for command repeating)
Max. CAN Baud rate:	1 MBaud
Max. USB transfer rate:	1.4 MBit/s USB full-speed
Dimensions (L*B*H):	112 * 65 * 28 mm
Weight:	approx. 120g without battery / approx. 170g incl. battery

14 Contact information

For fast processing of your enquiries please contact the following respective address:

14.1 Support

For technical support pleas contact us with the following address:

Address: Peter Systemtechnik GmbH
Hinterm Dorf 29
D-76199 Karlsruhe
Email: support@pst-gmbh.net

14.2 Individual development and product adaptation

For individual product adaptation or corporate development please contact the following address:

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Hinterm Dorf 29
D-76199 Karlsruhe
Tel.: (+) 49-721-509806-11
Fax: (+) 49-721-509806-28
Email: info@pst-gmbh.net

14.3 Other enquiries

Enquiries for distribution, pricelists or others pleas send to the following address:

Address: Peter Systemtechnik GmbH
Hinterm Dorf 29
D-76199 Karlsruhe
Tel.: (+) 49-721-509806-20
Fax: (+) 49-721-509806-28
Email: vertrieb@pst-gmbh.net

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